Gary Rule
National Oceanic and Atmospheric Agency Fisheries Service
Northwest Regional Office
Protected Resources Division
525 Northeast Oregon Street
Portland, OR 97232-2737

Dear Gary Rule:

I am writing to request a section 10 permit in order to carry out the Washington State portion of the Environmental Protection Agency's (EPA) Nation Rivers and Streams Assessment. This study will occur in water with listed anadromous runs located throughout the state of Washington. The Washington State Department of Ecology (DOE) will carry out work under an EPA contract. DOE will also use this data to assess the relationship between aquatic macro-invertebrates and stream temperature. To assess the nation's rivers and streams, DOE will collect fish tissue samples and fish assemblage data using both a back pack and a boat electro-shocker.

I understand that DOE currently has a permit to shock and collect fish for fish tissue samples pertinent to the assessment of toxics in our state water. We are applying for a separate permit, because the fish data we will collect is just one component of our entire study, while fish tissue data makes up a significant percentage of the State's Toxic Unit's data.

We will also be collecting macro-invertebrate samples using a D-frame kick net. We are not listing this as an activity that might cause an incidental take. We have historically collected aquatic macro-invertebrates using this method and have never caught a salmonid in our nets. We have caught sculpin. We also train crew on how to recognize redds so as not to disturb redds when collecting an invertebrate sample.

Dylan Monahan
Aquatic Ecologist
Washington State Department of Ecology
Environmental Assessment Program
500 Desmond Drive S.E.
Lacey, WA 98503-1273
360-407-6369
dymo461@ecy.wa.gov

A. **Title**:
Application for Permit for Scientific Purposes under the Endangered Species Act of 1973.

Project Name:
Washington State's Commitment to the EPA National Rivers and Stream Assessment

B. **Species**:

- Upper Columbia River (UCR) Spring Run Chinook (*Oncorhynchus tshawytscha*)
- Lower Columbia River (LCR) Chinook Salmon
- Puget Sound (PS) Chinook Salmon
- Snake River (SnR) Fall Run Chinook Salmon
- Snake River Spring/Summer Run Chinook
- Columbia River (CR) Chum Salmon (*O. keta*)
- Hood Canal (HC) Summer Run Chum Salmon
- Lower Columbia River Coho Salmon (*O. kisutch*)
- Snake River Sockeye Salmon (*O. nerka*)
- Upper Columbia River Steelhead (*O. mykiss*)
- Lower Columbia River Steelhead
- Middle Columbia River (MCR) Steelhead
- Puget Sound Steelhead
- Snake River Steelhead

C. **May 1, 2008**

D. **Applicant Identity:**
Dylan Monahan
Environmental Specialist 3
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600
360-407-6369
dymo461@ecy.wa.gov

Principal contact:
Glenn Merritt
Environmental Specialist 4
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600
360-407-6777
gmer461@ecy.wa.gov

E. **Information on Personnel, Cooperators, and Sponsors**: If the same person or entity will hold several roles, you may state their address information once and refer back to it.

1. Principal Investigator: Dylan Monahan (contact information is listed above)

2. Field Supervisor: Glenn Merritt (contact information is listed above)

3. Field Staff:
Jill Lemmon
Environmental Specialist 3
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
360-407-6530
jlem461@ecy.wa.gov

Bob Hughes
Department of Fisheries & Wildlife,
Oregon State University
200 SW 35th St.
Corvallis, OR 97333 United States

Jason Adams
1525 11th ST NW
Corvallis, OR 97330
(541) 758-4080
carbonadams@yahoo.com

4. Sponsor: This project is funded by the U.S. Environmental Protection Agency (EPA).

Ellen Tarquinio
USEPA Office of Wetlands, Oceans and Watersheds
1200 Pennsylvania Avenue
4503-T
Washington DC 20460
202-566-2267

5. Contractors:
There will be no contractors.

6. Disposition of any tissue samples, dead specimens, or other remains:
We will not collect tissue samples from listed species.

7. Transport and long-term holding of listed species:

There will be no long term holding or transport of listed species**.**

F. Project Description, Purpose, and Significance

1. Justification of the objectives:

The intention of the National Rivers and Streams Assessment (NRSA) project is to provide a comprehensive "State of the Flowing Waters" assessment for rivers and streams across the United States, using a probabilistic sampling design. The NRSA is a probabilistic assessment of the condition of our Nation's rivers and streams and is designed to:

- Assess the condition of the Nation's rivers and streams
- Establish a baseline to compare future rivers and streams surveys for trends assessments
- Evaluate changes in condition from the 2004 Wadeable Streams Assessment
- Help build State and Tribal capacity for monitoring and assessment and promote collaboration across jurisdictional boundaries

The purpose of these assessments is to generate statistically-valid reports on the condition of our Nation's water resources and identify key stressors to these systems. The goal of the NRSA is to address two key questions about the quality of the Nation's rivers and streams:

- What percent of the Nation's rivers and streams are in good, fair, and poor condition for key indicators of water quality, ecological health, and recreation?
- What is the relative importance of key stressors such as nutrients and pathogens?

We intend to carry out the Washington State portion of the National Rivers and Streams Assessment. We also intend on using biological data to develop metrics and models for assessing anthropogenic disturbances on biological communities, including fish assemblages and fish tissue sampling, in Washington State.

Fish Assemblage

The fish sampling methods are designed to collect all but the rarest fish inhabiting the near-shore habitat at a site. The sample is assumed to accurately represent the proportional abundance of the fish assemblage at the site. Fish sample data include species composition and the size and condition of individual fish. The goal is to collect fish community data that is representative of the sampling reach and that will allow the calculation of an IBI and O/E model

Fish Tissue

We will collect one predator species composite from each site for human health related analyses. The focus is on fish species that commonly occur throughout the region of interest, and that are sufficiently abundant within a sampling reach. Each composite sample will consist of five adult fish of the same species that are similar in size (the smallest individual in the composite is no less than 75% of the total length of the largest individual).

2. This program is being carried out at the behest and recommendation of the U.S. Federal Environmental Protection Agency. The funding for this project is secured and includes EPA funding for the National Rivers and Streams Survey. Additional funding will com from federal EPA 106 money. Below is our contact person.

   Ellen Tarquinio
   USEPA Office of Wetlands, Oceans and Watersheds
   1200 Pennsylvania Avenue (4503T)
   Washington DC 20460
   Phone: 202-566-2267

3. A statement of whether or not the proposed project or program has broader significance than the individual project's goals, or is part of a larger scale research management or restoration plan:
   Washington State Department of Ecology (Environmental Assessment Program) is participating in this project to complete the Washington state component of EPA's National Rivers and Streams Assessment. All data goes to EPA's national assessment of river and stream health. As mentioned above, this project is part of a greater federal assessment of the nation's surface water (lakes, wetlands, shorelines).

4. A description of any relationships or similarities of the proposed activities to other proposed or ongoing projects and programs, and whether the potential exists to cooperate and coordinate with other similar studies or activities. (Include citations if applicable):

   Washington's National River and Stream project is in active collaboration with Ecology's toxics group. On sites that suit both of our project goals we are combining fishing efforts in order to reduce the impact on listed species. We are limited in our ability to combine our efforts on too many rivers. The EPA study is a probability based study where the population is every river and stream in Washington State. To preserve the integrity and power of the data set, we are required to only sample in those reaches and on those water bodies that were drawn through random sampling. Fish data is just one component of our data set, to be included with habitat, benthic and chemistry data among other components. If in this study we sample a site where we don't catch any fish that is an important component of our data. Ecology's Toxics program targets specific rivers and requires sampling in places they are assured they will collect fish. Both programs will cooperate as much as possible given the limitations of the study sample design.

5. A justification for using listed species in the study or activities, and a discussion of possible alternatives to using listed species.
   We will not target listed species, but we may unintentionally shock and catch listed species. This unintentional take will be minimized as much as possible. Because this study is very similar in methods and controls as past studies that I have carried out for

Ecology, I have used data from past sampling in the years 1999-2004 and feel that an estimate of less than <5% mortality rate is appropriate

G. Project Methodology: Provide a detailed description of the project, or program, in which the listed species is to be used, including:

1. The proposed duration of the project or program:
The duration of this project will be from June 2008 through October 2010. During those years, we will sample and electrofish from June 15th to October 15th only.

2. A discussion of the procedures and techniques which will be used during the project:
The following information is found in the attached field operations manual: USEPA. 2007. National Rivers and Streams Assessment: Field Operations Manual. EPA-841-B-07-009. U.S. Environmental Protection Agency, Washington, DC.

    a. We will be sampling fish for two data sets; fish composition and fish tissue sampling.

    Fish Composition:
    Sites that fish will be collected at are 40X wetted width (maximum 500 meters and minimum 150 meter reaches), wetted width as defined at the X site (given lat long). Fish composition sampling is designed to sample all but the rarest fish inhabiting near shore habitat at a site. Data will be collected using a back pack shocker or boat shocker. Data collected at this site will include species composition and size of individual fish. For wadeable sites shocked with the backpack shocker the whole reach will be shocked. Shocking will be carried out using NOAA's NMFS "Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act" (June 2005). For non-wadeable sites we will use an electro-shock boat (raft or drift) sampling 11 (50M X 12M) near shore sub-reaches evenly spaced from the top of the reach to the bottom. Study reaches are laid out using 40 X wetted width, with 11 transects spaced 1/10 distance between each other. Fishing will occur between transects and fish will be processed at each transect. Fish caught will be immediately placed in a water-filled bucket. Fish identified as listed or threatened will be returned immediately if they are caught. Fish will be under constant visual assessment; if it seems like they are stressed we will change the water. Every effort will be made in the process to handle fish as little as possible. Fish will be identified to species. Fish will also be photographed when possible. We will measure the total length of the largest and smallest individuals of each non-listed species, and keep a tally of any anomalies found on fish. We will record the total number of mortalities caused by electro-fishing. Voucher species will be collected using either visual digital photographs of the species or collecting specimens. Voucher specimens will be preserved using NOTOXhisto and will NOT CONSIST of listed species.

    Fish Tissue sampling:

During the same sampling event that the fish composition sample is collected, fish tissue sample will also be collected. We will use both back pack shocker and boat shocker for wadeable and non-wadeable rivers. No listed or threatened species will be collected for fish tissue samples. Once a listed or threatened species is caught and identified, it will be safely returned to the water. One predator species composition will be collected per site. We expect to collect the following species for collection: *Micropterus salmodies; Micropteru dolomieu; Pomoxis nigromaclatus; Pomoxis annularis; Sander vitreus; Perca flavescens; Morone chrysops; Esox lucius; Salvelinus namaycush; Salmo trutta; Oncorhynchus mykiss* (only where we can be assured they are not listed*); and Salvelinus fontinalis.* Once a species has been designated as a target predator fish tissue sample; a sample will only be collected if enough fish are colleted equal to or greater than 500 grams; fish must meet legal harvest requirements. Each fish will be measured for total body length. Each fish sample will be recorded and then wrapped in heavy aluminum, and sent to the EPA lab for lab analysis.

b. The sampling schedule, including locations and dates if available.
   The following list of sites will be sample from June 15th to October 15th, in the years 2008 and 2009.
   Table 1. Activity Location and Date

SITEID	Stream Name	LONG	LAT	WRIA #	WRIA Name	BULL_TROU	Township Range Section
FW08WA001	Bracken Creek	-118.500287	48.669372	52	Sanpoil	No	37N34E27
FW08WA002	Cougar Creek	-117.640172	46.094188	35	Middle Snake	Threatened	07N41E11
FW08WA003	Little North River	-123.590693	46.915879	24	Willapa	Threatened	17N07W32
FW08WA004	Rushingwater Creek	-121.989999	46.896298	10	Puyallup-White	Threatened	16N06E01
FW08WA005	Quartz Creek	-121.793887	46.208867	27	Lewis	Threatened	08N08E03
FW08WA006	Twentyfive Mile Creek	-120.306707	47.934476	47	Chelan	No	28N20E15
FW08WA007	Peshastin Creek	-120.661075	47.462884	45	Wenatchee	Threatened	23N17E25
FW08WA008	BLANK (Trib to Duckabush)	-123.353592	47.651142	16	Skokomish-Dosewall	Threatened	25N05W17
FW08WA009	Cascade Creek	-121.587295	46.131712	29	Wind-White Salmon	Threatened	08N10E32
FW08WA010	Medicine Creek	-122.721291	47.051491	11	Nisqually	Threatened	18N01E40
FW08WA011	BLANK (unnamed flume)	-119.442267	48.863232	49	Okanogan	Threatened	39N27E21
FW08WA013	BLANK (unnamed ditch)	-122.351165	48.348423	3	Lower Skagit / Samis	Threatened	33N04E18
FW08WA014	BLANK (Trib to North R)	-123.890597	46.773465	24	Willapa	Threatened	15N10W23
FW08WA015	Similkameen River	-119.693320	48.956079	49	Okanogan	Threatened	40N25E21
FW08WA016	Columbia River	-120.417531	45.698610	31	Rock-Glade	Threatened	03N19E34
FW08WA017	Skagit River	-122.053438	48.523735	3	Lower Skagit / Samis	Threatened	35N06E17
FW08WA018	Ahtanum Creek	-120.784251	46.527058	37	Lower Yakima	Threatened	12N16E14
FW08WA019	BLANK (Trib to Cedar)	-120.507444	48.534856	48	Methow	Threatened	35N19E17
FW08WA020	Touchet River	-118.192478	46.276171	32	Walla Walla	Threatened	09N37E09
FW08WA021	Kiona Creek	-122.041435	46.537757	26	Cowlitz	Threatened	12N06E10
FW08WA022	South Fork Skykomish River	-121.427565	47.728916	7	Snohomish	Threatened	26N11E20
FW08WA023	Columbia River	-118.193408	48.202900	58	Middle Lake Rooseve	Threatened	31N37E07
FW08WA024	Snake River	-116.928655	46.021527	35	Middle Snake	Threatened	06N47E04
FW08WA025	Klickitat River	-121.260778	45.714752	30	Klickitat	Threatened	03N12E26
FW08WA026	BLANK (Right Fork Raimie Cr	-123.386274	46.837573	24	Willapa	Threatened	16N06W36
FW08WA027	Rocky Creek	-117.663464	48.723957	61	Upper Lake Rooseve	Threatened	37N41E08
FW08WA028	Trail Lake Coulee	-119.292442	47.503830	42	Grand Coulee	No	23N28E10
FW08WA029	Skykomish River	-121.694596	47.843582	7	Snohomish	Threatened	27N09E07
FW08WA030	Elochoman River	-123.392955	46.228955	25	Grays/Elochoman	Threatened	09N06W35
FW08WA031	Sandy Creek	-121.720023	48.681357	4	Upper Skagit	Threatened	37N08E23
FW08WA032	Yakima River	-119.570475	46.271170	37	Lower Yakima	Threatened	09N26E16
FW08WA033	Snoqualmie River	-121.966262	47.692118	7	Snohomish	Threatened	26N07E31
FW08WA034	BLANK (West Canal)	-119.367804	47.423901	42	Grand Coulee	No	22N27E12
FW08WA035	Methow River	-120.116716	48.252507	48	Methow	Threatened	32N22E20
FW08WA036	Snake River (Lower Granite La	-117.414109	46.655985	35	Middle Snake	Threatened	14N43E33
FW08WA037	Monahan Creek	-122.993359	46.278215	26	Cowlitz	Threatened	09N03W12
FW08WA038	Fall Creek	-120.796558	47.654826	45	Wenatchee	Threatened	25N16E24
FW08WA039	Columbia River (FDR Lake)	-118.386766	47.831117	53	Lower Lake Rooseve	Threatened	27N35E22
FW08WA040	Spokane River	-117.217191	47.679816	57	Middle Spokane	No	25N44E11
FW08WA041	Columbia River	-122.809680	45.914026	27	Lewis	Threatened	05N01W16
FW08WA043	Colville River (FDR Lake)	-118.098928	48.572922	59	Colville	No	36N37E36
FW08WA044	Yakima River	-120.289588	46.404422	37	Lower Yakima	Threatened	11N20E26
FW08WA045	Elwha River	-123.599621	48.003293	18	Elwha-Dungeness	Threatened	29N07W17
FW08WA046	Rattlesnake Creek	-121.091125	46.799314	38	Naches	Threatened	15N14E09

c. We will not do any tagging.

d. A description of type and dosage of any drugs to be used, purpose of use, and method of
No drugs will be administered to listed fish.

e. Temporary holding time prior to release of the individual(s) and the manner in which they will be detained:
We will release listed fish immediately.

f. Number and types of samples to be taken from each individual, including sampling protocol:

From each listed individual, we will take a rough length estimate with minimal handling and stress.

3. A discussion of possible alternatives to using the proposed methods. If applicable, you should try to anticipate alternative scenarios due to circumstances such as changes in environmental conditions, annual variations in species abundance, necessary changes in proposed procedures, etc. Such scenarios should be addressed in the *Description and Estimates of Take* section below if they affect the nature or amount of potential take of listed species.

Because of the need to stay consistent with a national protocol we have no alternative and will not fish where we can't do so using proposed methodology.

4. A discussion of the potential for injury or mortality to the species involved, and the steps that will be taken to minimize adverse effects and to ensure that the species will be taken in a humane manner.

The types of injuries that could occur to listed fish are those that occur due to accidental electro-shock fatalities and non lethal injuries. In order to minimize shock fatalities we will follow the protocol below, as well as NOAA NMFS Electro-fishing Guidelines. In order to minimize non-lethal injuries we will visually inspect all fish captured for burn marks. If we find that we are burning fish or that fish are having a slow time recovering we will reduce the setting on our shocker.

Environmental/Biological Factors:

1. No electrofishing should be conducted when temperatures are below 4C or above 18C.
2. No electrofishing should be conducted when samplers cannot clearly see the stream bottom in one foot of water.
3. Once a listed fish is found, discontinue shocking. Move upstream until habitat parameters change, which might indicate a change in the status of fish presence, and resume shocking.
4. To increase probability of detection, electroshocking should never be conducted alone. In any case, a separate hand-held net should always be positioned downstream from the anode so that fish will not be swept away in the current without being detected.
5. Remove netted fish from electrical field immediately; do not hold fish in net while continuing to net additional fish.

Equipment Factors:

1. Use electrofishing units with straight direct current (DC) settings if at all possible.
2. If straight DC is not an option, begin by sampling with lower frequencies or pulse rates (i.e. 30 Hz).
3. Avoid electrofishing units that cannot produce pulsed DC with frequencies less than 60 Hz.
4. If pulse width is a programmable option on your unit, use 5 milliseconds, which has proven to be highly effective under a wide range of conductivities and minimizes injury rates.
5. Never use any form of alternating current (AC) output.

Testing and Programming Equipment: In order to increase electrofishing efficiency, equipment needs to be tested and programmed correctly for the **specific drainage**. The intent is that if the sampler can first be successful in netting fish within known fish-bearing segments, he/she will have a higher confidence and probability of finding fish within segments where presence is uncertain. Use the procedure described below before beginning your official stream typing.

A. Go downstream from the segment in which the stream typing is to be conducted to a **known fish-bearing area** with a high probability of finding fish. Areas below culverts, deeper pools with woody cover, etc. are good places to start. This testing should be conducted on the same day as the stream typing in order to avoid environmental changes that may affect electrofishing efficiency.

B. With the recommended **straight DC**, start with lower voltages (i.e. 200 V). If fish are not drawn close enough to anode to be netted (after 5 minutes of shocking) at lower voltage setting, increase to next higher voltage setting (up to maximum of 800 V). Low to moderate voltage settings (300-500 V) are most commonly used. As soon as fish can be drawn close enough to anode to be netted, use those settings for stream typing. If fish cannot be drawn to anode, proceed to "C". [**Remember**: Keep power switch on until fish is netted; otherwise, fish will dart away.]

C. With **pulsed DC**, start with lower frequency and voltage (30 Hz and 300 Volts). If fish are not drawn close enough to anode to be netted (after 5 minutes of shocking) at lower voltage setting, increase to next higher voltage setting (keeping frequency the same).

D. If lower frequency setting (30 Hz) is ineffective in drawing fish close enough to anode to be netted, even at higher voltage settings, **then** turn frequency up to next setting (40 Hz) and repeat as in step "C". Follow the same steps for 50 Hz and 60 Hz if necessary. Sixty (60) Hz should be the highest frequency necessary. Due to higher injury rates, 60 Hz should be used as last resort. [**Remember:** Increase voltage settings before going to higher frequency setting.]

H. Description and Estimates of Take

Provide a separate table for each project, activity, or location, if appropriate. Attach the table at the end of the application.
See Table 1 above and Table 2 below.

1. Describe the recent status and trends of each ESU/species proposed to be taken (include citations where possible
We do not have any new information to contribute.

2. Provide a justification for all potential mortalities by take category. You should explain how you determined the numbers of listed species that would be killed, either intentionally (direct mortality, lethal take) or unintentionally (indirect mortality). You may reference section G.4. in explaining mortality rates.

We used mortality data from past Washington State Department of Ecology probability studies using the same methodology and study design. We also used estimates of run time and our schedule to estimate potential of shocking while listed runs were in the stream in attempt to avoid unintentional mortality.

3. Provide details on how all take estimates, including mortalities, were derived. Include citations when applicable.

I used data compiled by Kieth Siedrs of Washington State Department of Ecology's Toxic unit. We also used past estimates compiled by Bob Hughes of Dynamax and consulted with EPA for a similar project using very similar methodology. We also used data from our past probability based assessment studies that used the same methods, state wide distribution and seasonal activities to assess mortality rates. Our methods call for us

to stop shocking if we see a listed species in the past this has lead to very low mortality rates.

4. Include a statement as to whether or not any USFWS listed species would be affected. If any would be, include which species and DPS' and the authority you have to take those species (permit, consultation, agreement).
Listed Bull Trout will be affected during this study. We are applying for a Section 10 permit with USFW. We have made the changes to the first review and are awaiting approval.

I. Transportation and Holding
There will be no transportation and/or holding of listed species.

J. Cooperative Breeding Program
If requested, we will contribute data to a breeding program.

K. Previous or Concurrent Activities Involving Listed Species:

1. Identify all previous permits where you were the permit holder or primary investigator working with federally-listed species; identify which species.
I have not been the permit holder on any permits. However, I have over 100 hours of electro-shocking experience. I worked for the Washington Sate Department of Ecology and was trained by Glenn Merritt (permit holder) in the year 2000. J have listed Glenn's permits below. I shocked on Glenn's NOAA and USFW permit for the years 2000, 2001, 2002, 2004. I have well over 100 hours of electro-shocking on this project. This project was a statewide effort, so it included shocking in almost all ESU's in Washington State. During the year 2004 I worked for the Idaho Department of Environmental Quality and was trained on a raft/boat electro-shocker by Bob Hughes of Dynamacs Cooperation. That summer I fished extensively from a raft/shock boat.

Permits that I worked on held by Glenn Merritt or Bob Hughes

- **Permit No. 1156 Characterization of Benthic Macroinvertebrates, Fishes, and Amphibians in Rivers and Streams of Washington, Amended March 2000**
- **USFW Biological Assessment of Small Streams in the Cascades Ecoregion**. **Amended April 16, 2000**

L. Certification: You must include the following paragraph, exactly as worded, followed by the applicant or responsible party's signature, name, position title, and date:

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand this information is submitted for the purpose of

obtaining a permit under the Endangered Species Act of 1973 (ESA) and regulations promulgated there under, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the ESA."

_____

Signature Date

_____

Name and Position Title (print)

Attach résumés here or submit it/them as a separate document.

RESUME FOR DYLAN MONAHAN

2202-7 62nd Ave NW
Olympia, WA 98502
(360) 407-6369
mondy27@hotmail.com

Education: M.S. Environmental Studies, 2006
The Evergreen State College, Olympia WA

Graduate Thesis Project: Designed an original research project using ARC GIS and aerial photos to assess the affect of Washington State's Shoreline Management Act on the increase of impervious surface within the city limits of Puyallup, WA.

Professional Experience:

Aquatic Ecologist 2004 - Present
Washington State Department of Ecology, Olympia, WA
Lead Scientist on fresh water monitoring projects. I designs and implements projects that use biological indicators and random sampling to assess watershed health. Recent projects include a multi-agency study of the status of salmon habitat in the Wenatchee River Basin, Washington.

- Direct the collection of lotic habitat data and bio-monitoring data including substrate, channel morphology and land use data
- Design studies measuring intra-gravel dissolved oxygen using random sampling to create a method of detecting sediment problems in aquatic biological communities
- Develop ARC GIS databases to spatially analyze aquatic monitoring project

Wetland Ecology Technician 2004
Washington State Department of Ecology, Olympia, WA

- Collected data in support of a forested wetland regeneration study
- Delineated wetlands, counted saplings and contributed to study design and data analyses

Fishery Ecologist/GIS Technician 2003
Pacific State Marine Fishery Commission, Vancouver, WA

- Collected data for a study on an endangered run of Columbia River chum salmon
- Compiled salmon redd and fish count data as well as otolith samples
- Created GIS maps in support of programs designed to conserve chum salmon and green sturgeon

Aquatic Ecologist 2003
Idaho Department of Environmental Quality, Clearwater River Drainage, ID

- Collected water quality, habitat, invertebrate and fish data for a survey of Idaho's large rivers
- Piloted white water raft to collect a wide range of habitat data
- Electro-shocked from raft

Lead Aquatic Scientist 2003
Envirovision Inc., Olympia, WA

- Wrote and edited habitat assessments for an environmental consulting firm
- Created maps of invasive aquatic plants in ARC GIS for use in lake management plans
- Piloted boats during invasive aquatic plant surveys

Aquatic Ecology Technician 200-2003
Washington State Department of Ecology

- Collected physical, biological, and chemical data from wadeable streams
- Lead crew in field data collection
- Accrued over 100 hours electro-shocking fish using backpack shocker

Graduate Research Assistant 1998-2000
Young Stand Thinning and Diversity Study
The Evergreen State College/H.J. Andrews Research Forest, Olympia, WA /Blue River, OR

- Compiled stand development data in order to model the effect of four thinning treatments on young Douglas fir stands at the H.J. Andrews Research Forest

M. Length of Time and Cost to Prepare Application (Optional): The public burden of these application instructions is evaluated periodically by the Office of Management and Budget under the Paperwork Reduction Act. Your response will help improve the accuracy of the estimates given for evaluation. You may send comments regarding this estimate or any other aspect of this information collection, including suggestions for reducing this burden, to the Chief, Endangered Species Division, at the address under *Where Do I Send the Application?*

1. Please estimate the length of time, in hours, it took to compile this application:
   40 hours
2. Please estimate the cost, in $US, of compiling this application, excluding the labor hours identified in 1. above. This estimate should include: cost of paper, printing, mailing, photocopying, etc.:
   $20.00

Use this table to specify anticipated types and numerical estimates of annual take for listed species during individual research or enhancement activities. Use a separate table for each discrete project or location **and label tables accordingly**. Each row must be explained in the application. All mortalities must be justified.

Location/Project: See the table above.

Table 2. Anticipated Annual Take

ESU/Species	Life Stage	Take Activity	Origin	# of Fish Authorized for Take	Authorized Unintentional Mortality	Research Location	Research Period
UCR spring chinook	Juvenile	Capture, Handle, Release	Naturally Produced	35	1/35	Selected rivers in WA	June 15th to October 15th
UCR spring chinook	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
UCR spring chinook	Juvenile	Capture, Handle, Release	Artificially Propagated	35	1/35	Selected rivers in WA	June 15th to October 15th
UCR spring chinook	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
LCR chinook	Juvenile	Capture, Handle, Release	Naturally Produced	20	1/20	Selected rivers in WA	June 15th to October 15th
LCR chinook	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
LCR chinook	Juvenile	Capture, Handle, Release	Artificially Propagated	20	1/20	Selected rivers in WA	June 15th to October 15th
LCR chinook	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
PS chinook	Juvenile	Capture, Handle, Release	Naturally Produced	8	0/8	Selected rivers in WA	June 15th to October 15th
PS chinook	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
PS chinook	Juvenile	Capture, Handle, Release	Artificially Propagated	8	0/8	Selected rivers in WA	June 15th to October 15th
PS chinook	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
SnR fall chinook	Juvenile	Capture, Handle, Release	Naturally Produced	30	1/30	Selected rivers in WA	June 15th to October 15th
SnR fall chinook	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
SnR fall chinook	Juvenile	Capture, Handle, Release	Artificially Propagated	30	1/30	Selected rivers in WA	June 15th to October 15th
SnR fall chinook	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
SnR spring/summer chinook	Juvenile	Capture, Handle, Release	Naturally Produced	71	3/71	Selected rivers in WA	June 15th to October 15th
SnR spring/summer chinook	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th

SnR spring/summer chinook	Juvenile	Capture, Handle, Release	Artificially Propagated	71	3/71	Selected rivers in WA	June 15th to October 15th
SnR spring/summer chinook	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
CR chum	Juvenile	Capture, Handle, Release	Naturally Produced	2	0/2	Selected rivers in WA	June 15th to October 15th
CR chum	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
CR chum	Juvenile	Capture, Handle, Release	Artificially Propagated	2	0/2	Selected rivers in WA	June 15th to October 15th
CR chum	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
HC summer chum	Juvenile	Capture, Handle, Release	Naturally Produced	20	1/20	Selected rivers in WA	June 15th to October 15th
HC summer chum	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
HC summer chum	Juvenile	Capture, Handle, Release	Artificially Propagated	20	1/20	Selected rivers in WA	June 15th to October 15th
HC summer chum	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
LCR coho	Juvenile	Capture, Handle, Release	Naturally Produced	20	0/20	Selected rivers in WA	June 15th to October 15th
LCR coho	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
LCR coho	Juvenile	Capture, Handle, Release	Artificially Propagated	20	0/20	Selected rivers in WA	June 15th to October 15th
LCR coho	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
SnR sockeye	Juvenile	Capture, Handle, Release	Naturally Produced	5	0/5	Selected rivers in WA	June 15th to October 15th
SnR sockeye	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
SnR sockeye	Juvenile	Capture, Handle, Release	Artificially Propagated	5	0/5	Selected rivers in WA	June 15th to October 15th
SnR sockeye	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
UCR steelhead	Juvenile	Capture, Handle, Release	Naturally Produced	42	1/42	Selected rivers in WA	June 15th to October 15th
UCR steelhead	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
UCR steelhead	Juvenile	Capture, Handle, Release	Artificially Propagated	42	1/42	Selected rivers in WA	June 15th to October 15th
UCR steelhead	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
LCR steelhead	Juvenile	Capture, Handle, Release	Naturally Produced	26	1/26	Selected rivers in WA	June 15th to October 15th

LCR steelhead	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
LCR steelhead	Juvenile	Capture, Handle, Release	Artificially Propagated	1	1/26	Selected rivers in WA	June 15th to October 15th
LCR steelhead	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
MCR steelhead	Juvenile	Capture, Handle, Release	Naturally Produced	38	1/38	Selected rivers in WA	June 15th to October 15th
MCR steelhead	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
MCR steelhead	Juvenile	Capture, Handle, Release	Artificially Propagated	38	1/38	Selected rivers in WA	June 15th to October 15th
MCR steelhead	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th
PS steelhead	Juvenile	Capture, Handle, Release	Naturally Produced	10	1/10	Selected rivers in WA	June 15th to October 15th
PS steelhead	Adult	Capture, Handle, Release	Naturally Produced	4	0	Selected rivers in WA	June 15th to October 15th
PS steelhead	Juvenile	Capture, Handle, Release	Artificially Propagated	10	1/10	Selected rivers in WA	June 15th to October 15th
PS steelhead	Adult	Capture, Handle, Release	Artificially Propagated	4	0	Selected rivers in WA	June 15th to October 15th
SnR steelhead	Juvenile	Capture, Handle, Release	Naturally Produced	30	1/30	Selected rivers in WA	June 15th to October 15th
SnR steelhead	Adult	Capture, Handle, Release	Naturally Produced	1	0	Selected rivers in WA	June 15th to October 15th
SnR steelhead	Juvenile	Capture, Handle, Release	Artificially Propagated	30	1/30	Selected rivers in WA	June 15th to October 15th
SnR steelhead	Adult	Capture, Handle, Release	Artificially Propagated	1	0	Selected rivers in WA	June 15th to October 15th

References

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Year 2000 Annual Report for research completed in Oregon, Washington, Idaho, and Nevada by Dynamac Corporation

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